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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RAYMOND J. GORTE
and JOHN M. VOHS

Appeal 2010-006285
Application 10/053,085
Technology Center 1700

Before ADRIENE LEPIANE HANLON, PETER F. KRATZ, and
LINDA M. GAUDETTE, Administrative Patent Judges.

HANLON, Administrative Patent Judge.

DECISION ON APPEAL

A. STATEMENT OF THE CASE

This is an appeal under 35 U.S.C. § 134 from an Examiner's decision finally rejecting claims 2-19, 21-30, 55, 56, and 62-64, all of the pending claims.[1] We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

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[1] An oral hearing was held on April 13, 2011.

The subject matter on appeal relates to a solid oxide fuel cell system that is capable of directly operating with a sulfur-containing hydrocarbon fuel comprising, inter alia, a solid electrolyte and a porous anode wherein at least a portion of the anode is "bound" to the electrolyte.

Claim 62, reproduced below from the Claims Appendix to the Appeal Brief (emphasis added),[2] is illustrative.

> 62. A solid oxide fuel cell system capable of directly operating with a sulfur-containing hydrocarbon fuel that does not undergo prior treatment to remove organic sulfur compounds, comprising:
>
> (a) a solid electrolyte comprising an electronic insulator that allows transfer of anions;
>
> (b) an essentially nickel-free porous anode containing at least ceria deposited in the pores, the anode further comprising a ceramic, and at least a portion of the anode being bound to the electrolyte;
>
> (c) a cathode;
>
> (d) a fuel comprising a hydrocarbon having 2 or more carbons, and the fuel being characterized as having a sulfur content of from about 1 ppm to about 5000 ppm; and
>
> (e) an oxygen source;
>
> wherein the solid electrolyte and the porous anode overlap one another so as to define a region of physical contact between one another, the region of physical contact being characterized as an essentially uninterrupted interface.

The following Examiner's rejections are before us on appeal:

[2] Appeal Brief dated December 8, 2009.

Claims 2, 3, 5-12, 15, 16, 18, 21, 22, 24-30, 62, and 63 are rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Cable 903,[3] Isenberg,[4] and Keegan.[5,6]

Claims 4, 13, 14, and 23 are rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Cable 903, Isenberg, Keegan, and Anumakonda.[7]

Claims 17 and 19 are rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Cable 903, Isenberg, Keegan, and Wallin.[8]

Claims 55, 56, and 64 are rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Cable 903, Isenberg, Keegan, and Cable 285.[9]

B. ISSUE

The dispositive issue in this case is whether the Examiner reversibly erred in finding that Cable 903 describes a fuel cell wherein a portion of the anode is "bound" to the electrolyte as recited in the claims on appeal.

C. ANALYSIS

The Examiner finds that Cable 903 discloses a solid oxide fuel cell comprising a cathode, an anode, an electrolyte, oxygen, and fuel. Ans. 3.[10] Referring to Figure 1 of Cable 903, the Examiner contends that "the solid

[3] US 5,445,903 issued August 29, 1995.
[4] US 4,812,329 issued March 14, 1989.
[5] US 6,423,896 B1 issued July 23, 2002.
[6] Although claim 22 is not included in the statement of this rejection in the Final Office Action, the Examiner does discuss claim 22 in the body of the rejection. See Final Office Action dated April 10, 2009, at 9. Thus, claim 22 has been included in the statement of the rejection in this Decision on Appeal.
[7] US 6,221,280 B1 issued April 24, 2001.
[8] US 6,017,647 issued January 25, 2000.
[9] US 5,589,285 issued December 31, 1996.
[10] Examiner's Answer dated December 21, 2009.

electrolyte [6] and the anode [4] are placed next to each other (overlap), in physical contact (and are thus bound to one another), wherein the contact is seen to be an essentially uninterrupted interface." Ans. 5; see also Ans. 16.

The Appellants do not dispute that Figure 1 of Cable 903 shows an anode and an electrolyte next to one another. Reply Br. 4.[11] Rather, the Appellants contend that Cable 903 does not disclose that the anode and the electrolyte are "bound" to one another. App. Br. 12; Reply Br. 4. The Appellants argue that the Examiner's position requires the term "contact" to be synonymous with the term "bound." However, the Appellants argue that the two terms are not synonymous. For support, the Appellants direct us to definitions of "contact" (i.e., "to state or condition of touching") and "bound" (i.e., "adhere: stick to firmly"). Reply Br. 4.

The Examiner contends that the Appellants' definition of "bound" is too narrow and is not supported by the Specification. Ans. 45.

We recognize that the Appellants do not expressly define the term "bound" in the specification. However, the Appellants disclose (Spec. 11:4-13):

> The anode/electrolyte structure of the fuel cell of the invention may be prepared by any suitable method . . . . For example, the unsintered mixture of electronically-conductive and ionically-conductive materials may be deposited on a layer comprising a sintered or unsintered ionically-conductive electrolyte material prior to being sintered . . . . In one embodiment of such a process, the mixture of ionically-conductive and electronically-conductive materials is deposited on an unsintered layer of electrolyte material and the mixture and electrolyte layer are sintered simultaneously. In another embodiment, the mixture is deposited on a previously sintered layer of electrolyte, and then sintered.

Based on this disclosure, we conclude that the recited "portion of the anode being bound to the electrolyte" requires a level of adherence between a portion of

[11] Reply Brief dated February 18, 2010.

the anode and the electrolyte that corresponds to the level of adherence achieved by the disclosed sintering operation. See In re Icon Health and Fitness, Inc., 496 F.3d 1374, 1379 (Fed. Cir. 2007) ("claims must [be given] their broadest reasonable construction consistent with the specification" during examination).

We find that Cable 903 does not expressly disclose that a portion of the anode and the electrolyte are adhered to one another to any degree. To the extent that the Examiner has taken the position that binding between the anode and electrolyte may be inferred or is inherent from the teachings of Cable 903, we are not persuaded.

First, the Examiner points out the anode material of Cable 903 may be coated directly on the surface of the electrolyte. Ans. 28; Cable 903, at 5:5-22.

Although Cable 903 discloses that "a paint or ink containing substantially anode material . . . may be applied to the surface of the electrolyte adjacent the anode" (Cable 903 at 5:5-9), this coated electrolyte is nonetheless identified as an "electrolyte." Cable 903, at 5:18-22 (the "electrolyte" means the electrolyte with or without an anode material surface coating).

The Examiner also contends that the pressure of the unit cell stack would bind the anode to the electrolyte so as to prevent leakage, or, at the very least, the direct contact between the anode and the electrolyte would constitute an electrical bond between the anode and the electrolyte. Ans. 28.

Significantly, the Examiner has failed to direct us to any evidence or explain in any detail why pressure alone would bind the anode to the electrolyte in Cable 903. Moreover, the Examiner has failed to direct us to any evidence or explain in any detail why adherence between the anode and the electrolyte is necessary to prevent leakage or permit the flow of electrons. It seems to reason that direct

contact between the anode and the electrolyte coupled with a reasonable amount of pressure would be sufficient to prevent leakage and permit the flow of electrons.

In sum, the preponderance of the evidence does not support the Examiner's finding that Cable 903 describes that a portion of the anode is "bound" to the electrolyte as recited in the claims on appeal. The Examiner does not rely on the remaining prior art of record to cure this deficiency in Cable 903. Moreover, the Examiner does not explain in any detail why it would have been obvious to one of ordinary skill in the art to bind a portion of the anode to the electrolyte in Cable 903. Therefore, the § 103(a) rejections on appeal will be reversed.

D. DECISION

The decision of the Examiner is reversed.

REVERSED

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